

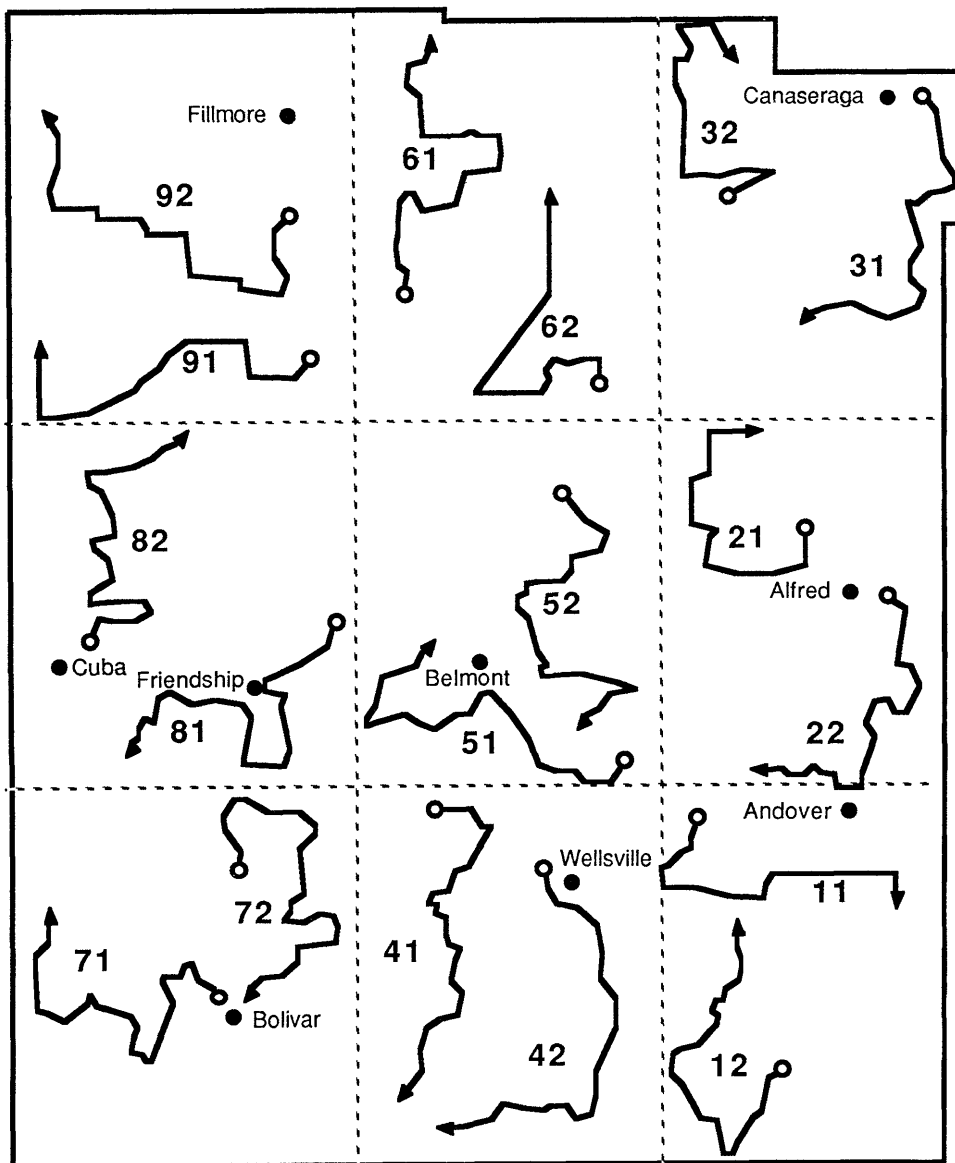


Figure 1. Location of census routes in Allegany County, New York.

THE ALLEGANY COUNTY BREEDING BIRD SURVEY

CLARENCE KLINGENSMITH and DEAN HOOVER

The Allegany County Breeding Bird Survey was instituted in 1970 to establish statistical indices of abundance of the breeding birds in the county and to monitor changes in these indices annually. The survey was patterned after the continent-wide Breeding Bird Survey developed by Chandler Robbins of the U.S. Fish and Wildlife Service during the 1960s (Robbins and VanVelzen 1967).

The purpose of this paper is to present a summary of the abundance indices and the changes which have occurred during the 15-year period 1970-1984.

Geographical Area

Allegany County in southern New York State embraces 670,000 acres that lie on the Allegheny Plateau. The southern part of the county primarily is heavily wooded terrain with narrow valleys and upland plateaus which reach elevations of 2400 feet. The northern part consists of hilly uplands and series of forested ridges. More than half of this northern section comprises the 200,000 acres of farmland in the county.

The central section of the county is densely spotted with 23 State Forest Lands, which have a total area of 45,000 acres. These were largely marginal farm lands which were planted to evergreens during the 1930s. The trees in these plantations are reaching a stature that permits harvesting of the logs for lumber.

The Genesee River, which crosses the county from south to north, is the principal drainage system. It enters the southern boundary at 1600 feet elevation and leaves the northern boundary at 1150 feet. The head waters of two other drainage systems occur within the county. The Allegheny River system is in the southwest and the Susquehanna river system is in the east.

Bodies of open water in the county are sparse. A dozen lakes have a total area of 1200 acres. Most of these are artificial impoundments, and many of them are surrounded by houses and cottages. A few marshes and swamps and other wetlands exist, but these provide major habitats only in a few localities.

Land use statistics reported by the Bureau of Census from 1969 to 1982 show changes which may affect bird populations. During that time, the proportion of the land in farms in Allegany County decreased from 38% to 32% and the number of farms decreased from 1100 to 900. The average size increased slightly.

Although harvested cropland has increased only slightly, the land used for pasture and grazing in 1982 was 60% of the amount in 1969. Acreage planted to corn and silage and acreage used for hay crops have increased substantially. The harvesting of grass now begins in the month of May and continues through a large part of the summer.

The population of the county is over 40,000. There are 29 towns and 12 villages, the largest of which is Wellsville with a population of 5800.

Methods

Eighteen 12-mile survey routes were laid out in 1970. These were distributed equally among nine rectangular parcels of the county. Each parcel is 10-12 miles on a side. The starting points and compass directions of the routes were chosen by random sampling. A map showing the distribution of the routes in Allegany County is found in Figure 1. Complete details and the locations of the routes were given previously (Klingensmith 1970).

Twenty-five "stops," spaced one-half mile apart, comprise the sampling unit referred to as a "route." These 18 routes provide a total of 450 sampling stations and represent a sampling density of one route for every 58 square miles. Thus, about 8.5% of the total area of the county is observed each year.

The surveys are conducted during June. Each survey starts 30 minutes before sunrise. At each stop, the observer or an assistant records the number of individuals of each species identified by voice at any distance or by sight within an estimated one-quarter mile for a three minute period. One of them also records the temperature, wind speed and sky condition. At the end of the route, the number of individuals of each species is totaled to complete the report. Each year after the routes are completed, the species count for each route is tabulated and the counts/route for each species found on one or more routes is computed.

Coverage of the 18 routes of this survey has been almost complete. Six of the routes have been conducted in each of the 15 years, and seven others lack only one year. The missing year is 1972, when flood waters washed out roads and bridges. Three routes lack two years and the other two routes have not been conducted during the last six years.

Fifteen observers, most of whom are members of the Allegany County Bird Club, have made the 15-year tenure of this survey possible. These observers have been assisted by an equal number of other members and friends of the bird club. Thirteen people have consistently run individual routes during the fifteen years of the survey. Although observers on the other five routes have varied, each route has had the same observer for several consecutive years.

Analysis of Data

The data were entered into Minitab, a statistical software package, on a Vax 11/780 computer. The annual counts/route for each of the species found on the survey for five years or more were analyzed by linear regression. The results are tabulated in Table 1. The first two columns, *mean* and *median* of the average counts/route, are measures of the abundance of the species. The *standard deviation* measures the variability in the counts. The *maximum* and *minimum* are the largest and the smallest average count per route in any one year. The *regression coefficient* measures the increase (positive value) or decrease (negative value) in the counts each year revealed by the line fit to the survey results. For example, the coefficient -1.13 for Song Sparrows indicates the line fit to the data shows an average decrease of 1.13 Song Sparrows per survey each year. The *Student T-value* tests the hypothesis that there is no change in the counts with respect to year; a T-value above 2 or below -2 indicates there is a significant change in the counts with respect to year at the 95% confidence level. The *coefficient of determination* gives the percentage of the total variation which can be explained by the regression line.

The annual counts/route for each species were plotted on graphs, a selection of which are presented below (Figures 2 to 9). With the aid of Minitab the yearly counts/route were smoothed using a method named "4253H Twice." Smoothing (Tukey, 1977) is a technical term for a method of analysis which allows one to see at a glance patterns which might otherwise be missed. The reader is cautioned that the vertical scale differs from graph to graph. If a value on the vertical axis is multiplied by the number of routes conducted, the result is the total number of birds of that species recorded for that year.

Results

One hundred twenty-six species were recorded on the survey during the 15-year period. Of this total, ninety-three species occurred in nine or more years. These are listed in Table 1 along with the results of the statistical analyses. The other thirty-two species (Table 2) occurred eight years or less and were not further analyzed. In most cases these species appear on the survey as a single individual for 3 years or less.

The 15-year mean of the annual counts/route of the 93 species detected regularly are listed in Table 1. These means range from 73.9 counts/route for Red-winged Blackbird to 0.06 for Northern Harrier. Eleven species have mean counts/route greater than 10, thirty-nine have mean counts/route between 1 and 10, and forty-four have mean counts/route less than 1. The two most abundant species are Red-winged Blackbird and American Robin. These two species are followed by European Starling,

Song Sparrow, American Crow, House Sparrow, Chipping Sparrow, Barn Swallow, Common Yellowthroat, and American Goldfinch, in that order.

In addition to providing a measure of the abundance of breeding species, this survey was undertaken to monitor changes in abundance. Decreasing abundance may be noted by the negative values of the regression coefficient and T-value in Table 1 and increasing abundance by the positive values. Changes significant at the 95% confidence level are denoted by T-values greater than 2 or less than -2 . By this criterion, abundance decreased for twenty-eight species listed in Table 1 and increased for nineteen species. Species with dramatic decreases (T-values less than -4) are Spotted Sandpiper, Northern Flicker, Eastern Phoebe, American Robin, Brown Thrasher, Rufous-sided Towhee, Song Sparrow, Eastern Meadowlark and House Sparrow. Figures 2 to 4 are "smoothed" graphs of three of these species. Species with dramatic increases (T-values greater than 4) are Black-capped Chickadee, Common Yellowthroat, and Indigo Bunting. Figures 5 and 6 are "smoothed" graphs of two of these species. Two other species showed marked increases in abundance. For the Ovenbird the annual counts/route dropped slightly during the first half of the 15-year period and then increased sharply (Figure 7). The House Finch (Figure 8) was not included in the statistical treatment because it has been recorded on the survey only since 1979. It was first recorded in Allegany County in 1973 (Anon, 1973). By 1984 forty-three House Finches were recorded at fourteen "stops" on seven routes on this survey.

Another type of change in abundance found on this breeding bird survey will be referred to as "cycling." The most striking example is the Great Crested Flycatcher (Figure 9). The graph shows two cycles with a period of about eight years. Whether or not this cycling will continue can be determined only by the continuation of this survey. It is of interest to point out that linear regression parameters alone would not reveal this type of change. Other species which show some tendency toward "cycling" are Mourning Dove, Gray Catbird, Blue-winged Warbler and Bobolink.

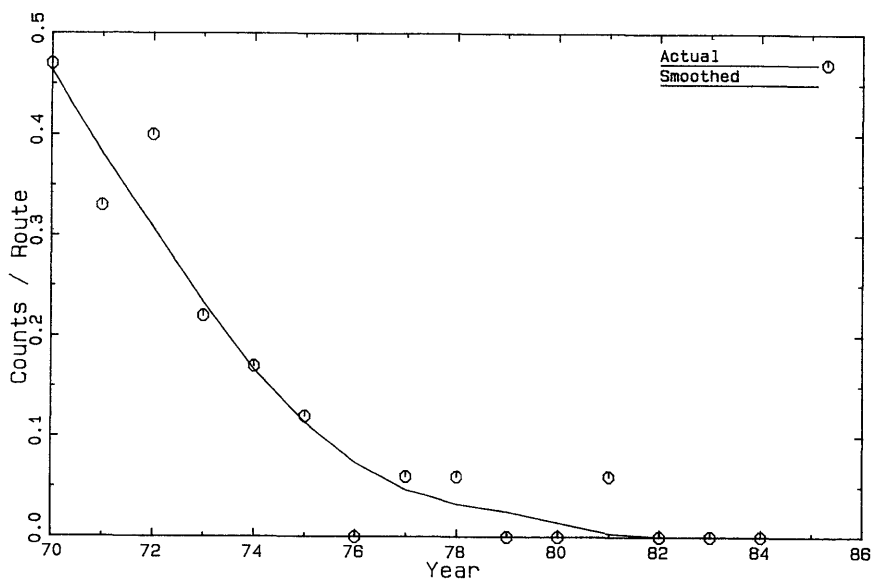


Figure 2. Spotted Sandpiper

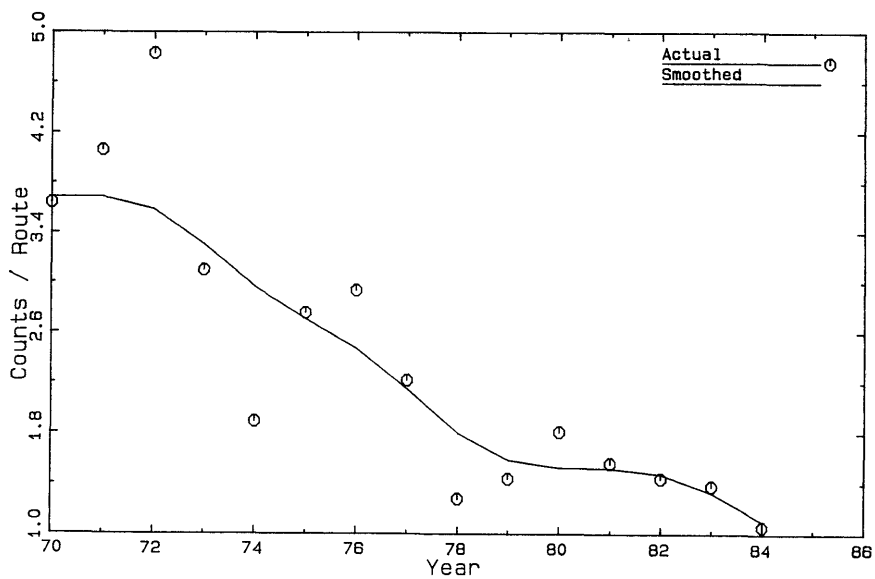


Figure 3. Northern Flicker

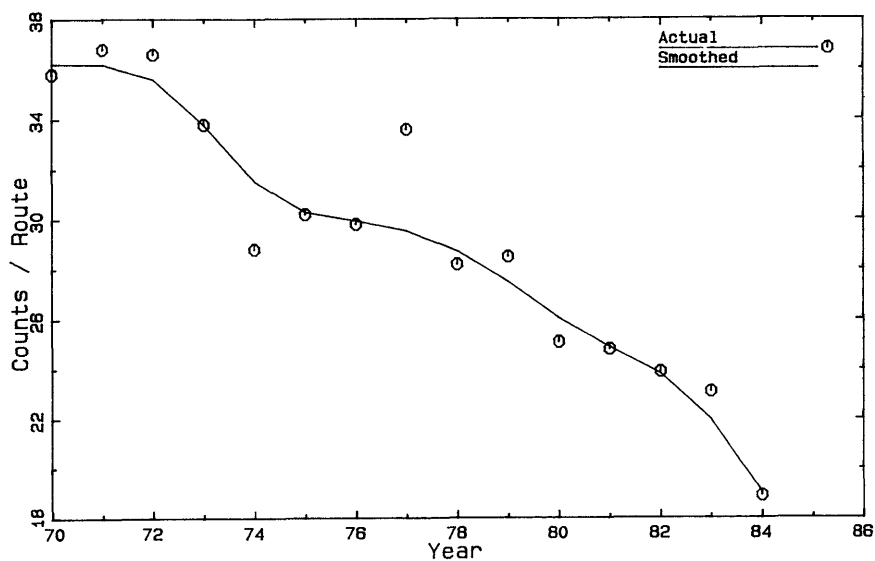


Figure 4. Song Sparrow

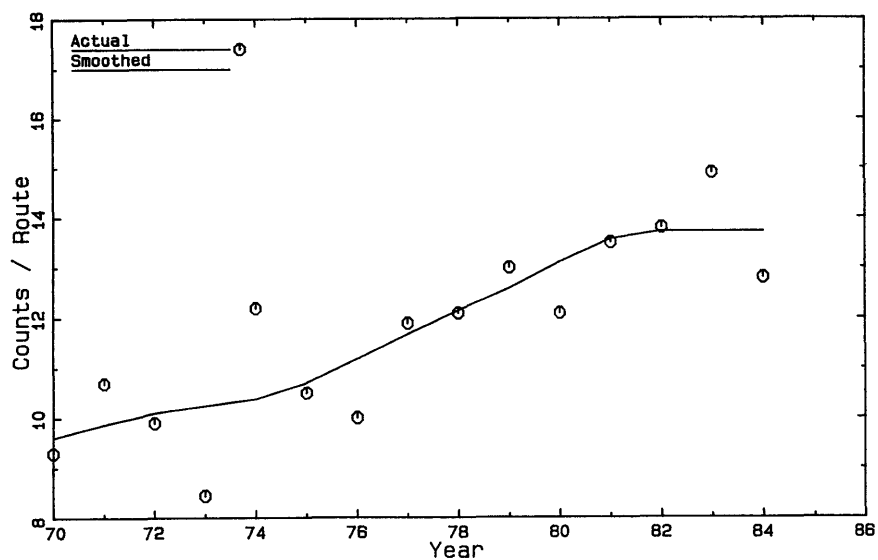


Figure 5. Common Yellowthroat

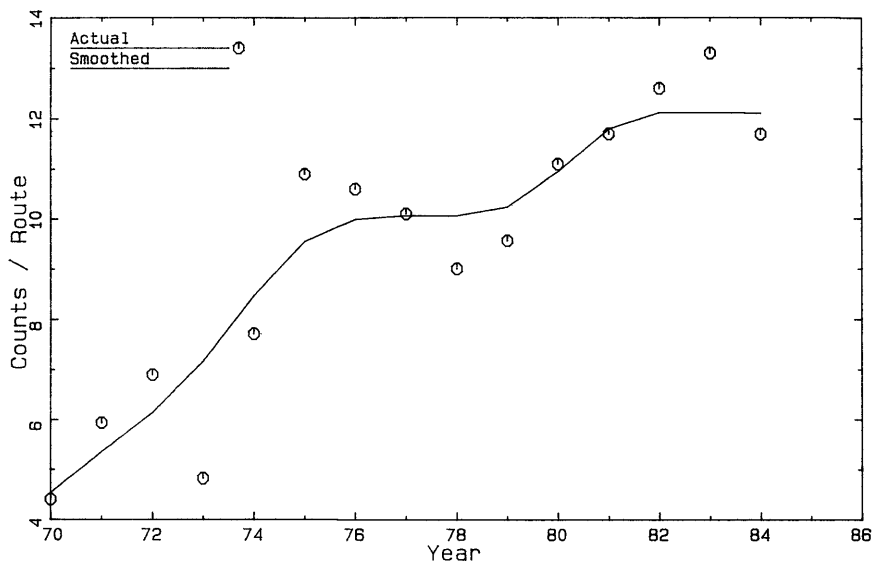


Figure 6. Indigo Bunting

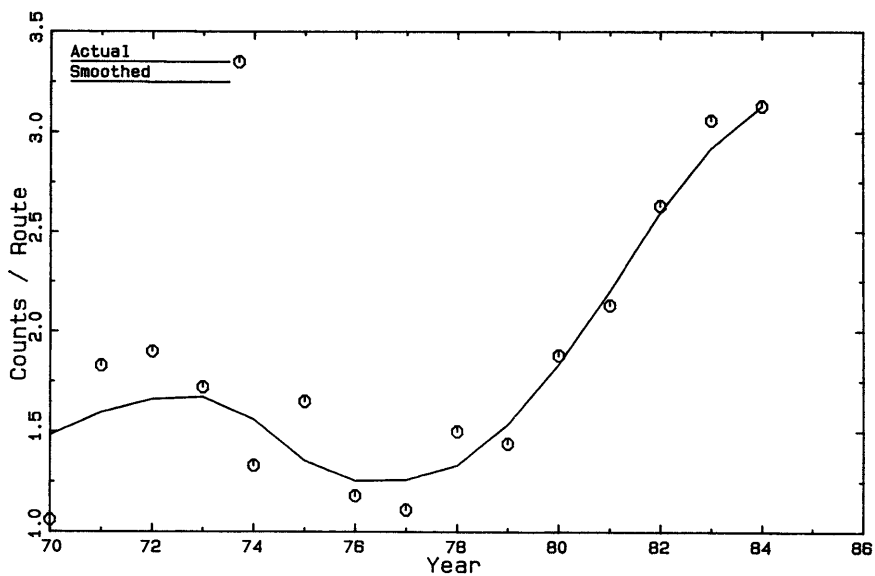


Figure 7. Ovenbird

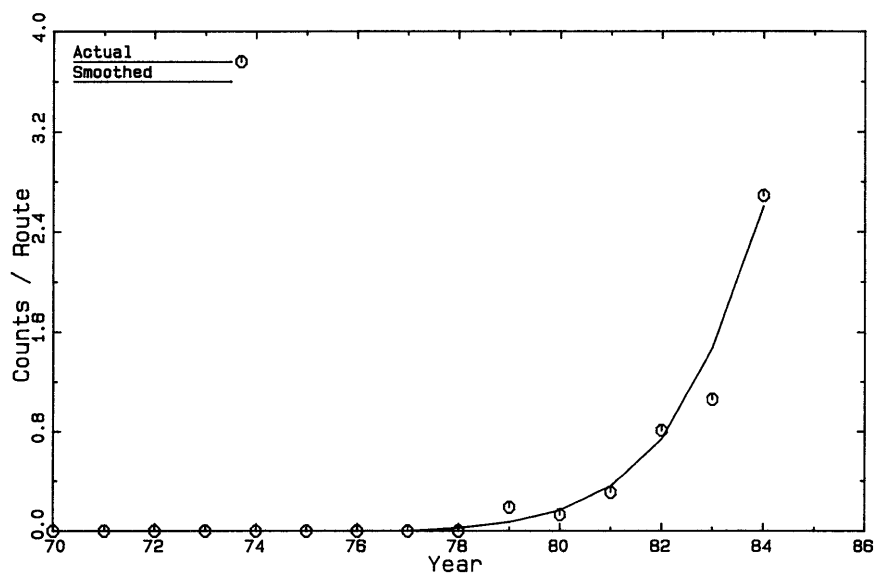


Figure 8. House Finch

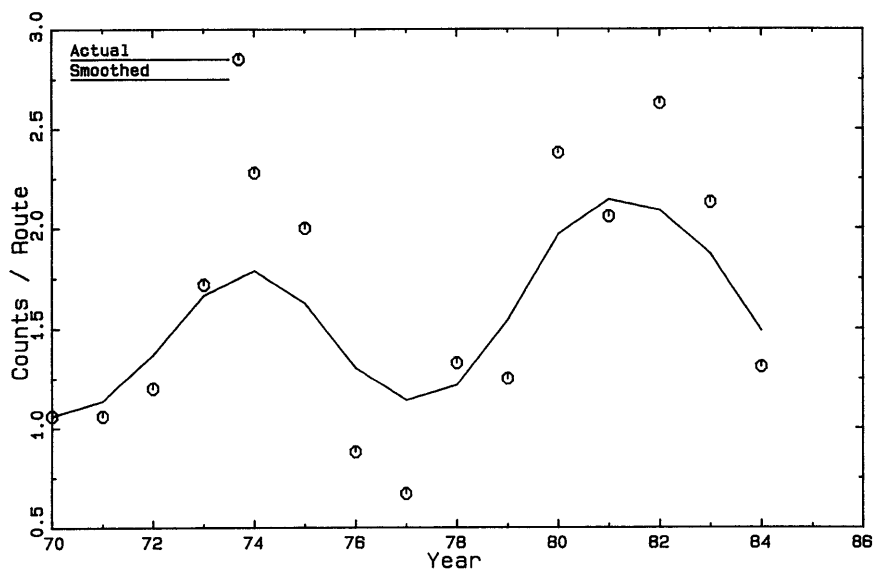


Figure 9. Great Crested Flycatcher

Discussion

The data presented in Table 1 has been gathered and assembled with considerable care for its accuracy and reliability, but our resources have not made it possible to subject the results to every possible control and test. One should also be reminded that the data has been gathered in an area that is only a small part of the entire range of most of the species. Any change in the abundance of a species changes in Allegany County may or may not happen elsewhere.

No attempt was made to search for a cause and effect relation between the status of the population of a species and the quality of the environment. Earlier in this article reference was made to changes in habitats and land management that could influence bird populations. These include maturation of 45,000 acres of evergreen plantation, an overall decrease in farmland acreage and the concomitant changes that occur in buildings and fields, a doubling of the acreage planted to grain, and early-season harvesting of grassland. These factors may have influenced bird populations in Allegany County, but it seems unlikely that a change in abundance is related to any simple habitat changes within the particular area of this survey. Moreover, most of the breeding species in Allegany County are only summer residents and spend the remainder of the year elsewhere. Changes in the abundance of these species may be caused by events outside of Allegany County.

Acknowledgments

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Table 1. Regularly Encountered Species

Species	Mean±S.D.	Max.	Median	Min.	Reg.Coef.	T	Coef.Det.
Great Blue Heron	0.67±0.31	1.31	0.65	0.04	0.04	2.4	31
Green-backed Heron	0.47±0.22	0.78	0.49	-0.03	-0.03	-3.7	51
Wood Duck	0.09±0.11	0.29	0.07	0.00	-0.02	-3.6	50
Mallard	0.32±0.23	0.83	0.33	0.00	0.02	1.4	12
Northern Harrier	0.06±0.06	0.18	0.06	0.00	-0.00	-0.5	2
Red-shouldered Hawk	0.14±0.13	0.50	0.12	0.00	-0.00	-0.8	5
Red-tailed Hawk	0.39±0.18	0.71	0.38	0.13	-0.02	-1.8	20
American Kestrel	0.47±0.17	0.83	0.44	0.13	-0.00	-0.8	5
Ring-necked Pheasant	0.33±0.17	0.72	0.31	0.06	-0.02	-1.7	18
Ruffed Grouse	0.15±0.11	0.44	0.12	0.07	-0.00	-0.1	0
Wild Turkey	0.17±0.20	0.81	0.13	0.00	0.02	1.5	15
Killdeer	3.43±1.13	6.11	3.33	1.63	-0.18	-3.7	52
Spotted Sandpiper	0.13±0.16	0.47	0.06	0.00	-0.03	-6.4	75
Common Snipe	0.07±0.07	0.19	0.06	0.00	0.01	4.2	60
Rock Dove	6.91±2.75	12.10	7.00	3.31	-0.36	-2.6	34
Mourning Dove	5.69±1.28	7.75	6.00	3.41	0.15	2.2	27
Black-billed Cuckoo	0.65±1.12	4.50	0.29	0.00	0.10	1.6	16
Yellow-billed Cuckoo	0.12±0.13	0.44	0.06	0.00	0.02	2.6	35
Chimney Swift	1.68±0.68	2.80	1.61	0.56	-0.10	-3.1	43
Ruby-thr. Hummingbird	0.17±0.09	0.39	0.13	0.06	-0.10	-1.8	20
Belted Kingfisher	0.84±0.37	1.83	0.89	0.38	-0.06	-3.6	49
Yellow-b. Sapsucker	0.21±0.21	0.69	0.13	0.00	0.02	1.2	10
Downy Woodpecker	1.07±0.38	1.78	1.06	0.50	-0.05	-2.6	34
Hairy Woodpecker	0.20±0.14	0.53	0.19	0.00	-0.02	-2.8	38
Northern Flicker	2.36±1.15	4.83	1.89	1.06	-0.22	-6.1	74
Pileated Woodpecker	0.16±0.09	0.39	0.17	0.06	-0.01	-3.3	45
Eastern Wood-Pewee	1.58±0.42	2.56	1.50	1.06	-0.05	-2.4	31
Traill's Flycatcher*	1.04±0.53	2.27	0.89	0.53	0.06	2.1	25
Least Flycatcher	2.66±0.67	4.70	2.50	2.00	-0.04	-1.0	7
Eastern Phoebe	4.80±1.96	10.20	4.72	2.88	-0.34	-4.4	60
Great Crested Flycatcher	1.60±0.61	2.63	1.33	0.60	0.06	1.7	17
Eastern Kingbird	2.85±0.63	4.24	2.71	2.06	-0.08	2.4	31
Horned Lark	0.49±0.44	1.67	0.41	0.00	-0.06	-2.9	38
Tree Swallow	1.68±0.53	2.64	1.81	0.70	0.01	0.2	0
Purple Martin	0.38±0.50	1.76	0.18	0.00	-0.07	-3.0	41
N. Rough-winged Swallow	0.11±0.08	0.25	0.11	0.00	-0.00	-1.0	7
Bank Swallow	1.09±1.58	6.06	0.53	0.06	-0.20	-2.5	33
Cliff Swallow	1.92±1.71	6.44	1.33	0.06	0.18	2.0	23
Barn Swallow	11.71±2.02	15.20	11.60	7.33	0.17	1.4	14
Blue Jay	6.36±1.61	9.13	6.33	4.00	-0.04	-0.4	1
American Crow	23.65±2.47	28.90	23.50	19.90	0.11	0.8	4
Black-capped Chickadee	5.22±1.43	7.56	5.35	3.30	0.25	4.5	61
White-breasted Nuthatch	0.47±0.34	1.41	0.35	0.13	-0.05	-3.5	47
House Wren	8.64±1.70	13.20	8.50	5.94	-0.04	-0.3	1
Eastern Bluebird	0.66±0.41	1.70	0.63	0.17	-0.04	-1.2	10
Veery	2.31±0.57	3.28	2.44	1.50	0.06	2.1	26
Hermit Thrush	0.23±0.13	0.44	0.13	0.00	0.00	0.2	0

Table 1. Regularly Encountered Species

Species	Mean±S.D.	Max.	Median	Min.	Reg.Coeff.	T	Coef.Det.
Wood Thrush	6.94±1.24	9.06	6.80	4.59	-0.04	-0.5	2
American Robin	51.92±6.47	66.90	50.80	41.20	-1.11	-4.4	59
Gray Catbird	7.42±0.86	8.94	7.19	6.13	0.03	0.5	2
Brown Thrasher	1.31±0.58	2.33	1.19	0.65	-0.10	-4.3	59
Cedar Waxwing	4.90±1.68	7.67	4.56	2.22	0.02	0.2	0
European Starling	34.88±8.18	54.80	34.70	23.40	-1.19	-3.1	42
Solitary Vireo	0.34±0.22	0.73	0.33	0.00	0.03	2.3	28
Yellow-throated Vireo	0.09±0.09	0.28	0.06	0.00	0.00	0.9	3
Warbling Vireo	0.72±0.28	1.31	0.75	0.24	0.02	1.3	11
Red-eyed Vireo	7.46±1.53	10.30	7.59	4.94	0.14	1.7	17
Blue-winged Warbler	0.95±0.45	1.75	0.89	0.35	0.06	2.5	33
Nashville Warbler	0.63±0.56	1.75	0.41	0.06	0.10	4.5	61
Yellow Warbler	7.12±1.23	8.72	7.44	4.82	0.11	1.5	15
Chestnut-sided Warbler	1.91±0.49	3.00	1.80	1.19	0.03	1.0	8
Magnolia Warbler	0.32±0.32	1.19	0.24	0.00	0.06	5.5	70
Yellow-rumped Warbler	0.14±0.15	0.44	0.06	0.00	0.03	4.8	64
Black-thr. Green Warbler	1.09±0.25	1.69	1.06	0.71	0.02	1.1	9
Blackburnian Warbler	0.30±0.15	0.70	0.28	0.11	-0.00	-0.3	1
American Redstart	0.47±0.20	0.88	0.44	0.19	-0.00	-0.1	0
Ovenbird	1.84±0.66	3.13	1.72	0.10	0.10	3.5	49
Mourning Warbler	0.25±0.09	0.44	0.22	0.12	0.01	1.7	19
Common Yellowthroat	11.68±1.82	14.90	12.10	8.44	0.34	5.7	71
Canada Warbler	0.13±0.12	0.50	0.11	0.00	-0.00	-0.4	1
Scarlet Tanager	1.83±0.37	2.25	1.88	0.90	0.04	2.0	24
Northern Cardinal	4.05±1.08	6.25	3.69	2.56	0.02	0.3	1
Rose-breasted Grosbeak	3.01±0.72	4.06	3.11	1.35	0.05	1.1	8
Indigo Bunting	9.36±2.80	13.30	10.10	4.41	0.56	7.2	80
Rufous-sided Towhee	5.98±1.63	8.40	5.39	4.17	-0.32	-6.6	77
Chipping Sparrow	13.30±2.36	17.50	12.80	9.17	0.29	2.3	29
Field Sparrow	8.88±1.30	11.10	8.89	6.72	0.20	-3.3	46
Vesper Sparrow	0.54±0.46	1.50	0.38	0.13	-0.10	-3.4	48
Savannah Sparrow	4.35±0.71	5.35	4.56	2.83	-0.08	-2.0	23
Grasshopper Sparrow	0.31±0.14	0.63	0.28	0.13	0.00	0.2	0
Henslow's Sparrow	0.29±0.20	0.76	0.31	0.00	0.00	0.1	0
Song Sparrow	29.19±5.39	36.80	28.80	18.90	-1.13	-9.6	88
Swamp Sparrow	0.48±0.30	0.94	0.41	0.00	-0.02	-0.9	5
White-throated Sparrow	0.22±0.11	0.47	0.20	0.06	0.00	0.3	1
Dark-eyed Junco	0.90±0.34	1.44	0.88	0.24	0.05	3.5	49
Bobolink	8.98±2.48	14.30	8.30	5.56	0.18	1.2	11
Red-winged Blackbird	73.90±13.5	91.80	77.10	48.00	-1.04	-1.3	12
Eastern Meadowlark	6.00±2.83	13.30	4.56	2.81	-0.52	-5.0	66
Common Grackle	28.39±6.66	40.30	27.60	18.50	-1.07	-3.7	52
Brown-headed Cowbird	2.97±1.94	8.80	2.75	0.69	-0.27	-2.9	40
Northern Oriole	2.83±0.82	4.50	2.75	1.31	-0.10	-1.8	21
Purple Finch	0.82±0.32	1.50	0.72	0.32	0.00	0.3	1
American Goldfinch	10.63±3.87	20.50	8.75	6.88	-0.60	-3.5	48
House Sparrow	18.60±5.14	26.20	20.10	9.44	-0.92	-4.8	64

*Willow and Alder Flycatchers combined

Table 2. Irregularly Encountered Species

Species	Years Observed	Species	Years Observed
Canada Goose	2	Red-breasted Nuthatch	6
Common Merganser	3	Brown Creeper	6
Sharp-shinned Hawk	8	Carolina Wren	1
Cooper's Hawk	7	Sedge Wren	1
Broad-winged Hawk	4	Golden-crowned Kinglet	8
Virginia Rail	1	Golden-winged Warbler	3
Sora	1	Northern Parula	1
Upland Sandpiper	2	Black-thr. Blue Warbler	3
American Woodcock	2	Prairie Warbler	5
Eastern Screech-Owl	2	Cerulean Warbler	2
Great Horned Owl	8	Black-and-white Warbler	3
Barred Owl	3	Northern Waterthrush	2
Long-eared Owl	1	Louisiana Waterthrush	4
Red-headed Woodpecker	8	Hooded Warbler	2
Red-bellied Woodpecker	2	House Finch	7
Tufted Titmouse	1	Red Crossbill	1